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EXAMINER	
EL CHANTI, HUSSEIN A	

ART UNIT	PAPER NUMBER
2157	

DATE MAILED: 11/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/538,132	LIAO, HENG	
	Examiner	Art Unit	
	Hussein A El-chanti	2157	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to RCE received on August 23, 2004. Claims 1, 11, 23, 31, 40, 47 and 51 were amended. Claims 1-54 are pending examination.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 11, 27, 31, 48 and 51 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 11, 27, 31, 48 and 51 recite the limitation "it" in the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-54 are rejected under 35 U.S.C. 102(e) as being anticipated by Narad et al., U.S. Patent No. 6,701,338 (referred to hereafter as Narad).

As to claim 1, Narad teaches a method for classifying data packets comprising the steps of:

Providing a language definition (see col. 36 lines 19-col. 37 lines 22); and

Processing incoming network data with said language definition in accordance with a formal language processing technique including scanning said network data using lexical token scanning according to said language definition, wherein said network data is treated as a stream of input bytes, said network data being organized into data packets, said scanning resulting in the identification of a data packet as belonging to one of a plurality of classes (see col. 4 lines 47-67, col. 9 lines 1-35, col. 8 lines 50-65 and col. 36 lines 19-col. 37 lines 22).

As to claims 2 and 24, Narad teaches the method of claims 1 and 23 respectively wherein said scanning includes identifying an arithmetic operation and performing said arithmetic operation (see col. 36 lines 45-60).

As to claims 3 and 27, Narad teaches the method of claims 1 and 26 respectively wherein said scanning includes identifying a skip operation and in response thereto skipping over one or more subsequent input bytes (see col. 36 lines 45-60 and abstract).

As to claims 4 and 25, Narad teaches the method of claims 1 and 23 respectively wherein said lexical scanning includes providing a set of regular expressions, each regular expression having an associated class identifier (see col. 36 lines 45-60).

As to claim 5, Narad teaches the method of claim 1 further including providing a deterministic finite automaton DFA comprising plural states, said step of scanning including recognizing data packets using said DFA including transitioning from one state to another (see col. 36 lines 45-60 and col. 103-col. 104).

As to claim 6, Narad teaches the method of claim 5 wherein said data packets are variable length data packets (see col. 36 lines 45-60 and col. 4-col. 5).

As to claim 7, Narad teaches the method of claim 5 wherein said DFA is defined by a set of regular expressions (see col. 36 lines 45-60).

As to claim 8, Narad teaches the method of claim 7 further including generating a grammar tree data structure representative of said regular expression, producing a non-deterministic finite automaton (NFA) from said grammar tree, data structure, and converting said NFA to produce said DFA (see col. 36 lines 45-60 and col. 103-col. 104).

As to claim 9, Narad teaches the method of claim 5 wherein some of said states include one or more associated computer instructions and wherein said computer instructions are executed in connection with transitioning to a state (see col. 36 lines 45-60).

As to claim 10, Narad teaches the method of claim 9 wherein some of said states further include a skip instruction.

As to claim 11, Narad teaches a method for classifying data packets comprising steps of: providing a language definition in the form of one or more regular expressions, each having an associated class identifier; receiving plural data packets, each having a length not necessarily equal to one another; and for each data packet, processing it in accordance with a formal language processing technique including determining a matching regular expression from among said regular expressions that matches said data packet, wherein said each data packet is classified according to the class identifier

associated with said matching regular expression (see col. 4 lines 47-67, col. 9 lines 1-35, col. 8 lines 50-65 and col. 36 lines 19-col. 37 lines 22)..

As to claim 12, Narad teaches the method of claim 11 wherein said data packets comprise a data stream and said determining includes lexically scanning said data stream (see col. 3-col. 4).

As to claim 13, Narad teaches the method of claim 1 I wherein said regular expressions are represented by a deterministic finite automaton (DFA) (see col. 103-col. 104).

As to claim 14, Narad teaches the method of claim 13 wherein said DFA is in compressed form (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 15, Narad teaches the method of claim 11 further including compiling said regular expressions to produce said DFA (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22 and col. 103-col. 104).

As to claim 16, Narad teaches the method of claim 15 wherein said compiling produces a non-deterministic finite automaton (NFA) as intermediate data structure, said compiling further includes converting said NFA to produce said DFA (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22 and col. 103-col. 104).

As to claim 17, Narad teaches the method of claim 16 further including reducing said DFA to a compressed form (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22 and col. 103-col. 104).

As to claim 18, Narad teaches the method of claim 11 wherein said data packet comprises plural bytes, and said determining includes detecting an operator indicating a number of bytes to be skipped (see table16-17).

As to claim 19, Narad teaches the method of claim 18 wherein said number is specified by the value of a current input byte (see table16-17).

As to claim 20, Narad teaches the method of claim 18 wherein said number is specified in a register (see table16-17).

As to claim 21, Narad teaches the method of claim 18 wherein said determining further includes detecting an operator indicating a value to be saved in a register .

As to claims 22 and 26, Narad teaches the method of claims 21 and 23 respectively wherein said determining further includes detecting an operator indicating a logical or mathematical operation to be performed on the contents of said register (see col. 36 lines 45-60).

As to claim 23, Narad teaches a method for classifying received data packets comprising a stream of data, said method comprising steps of: receiving a description of classification rules in the form of a classification language definition; compiling said classification language definition to produce a deterministic finite automaton (DFA) comprising plural states; configuring a programmable hardware packet classifier with said DFA; and receiving said data stream and processing it in accordance with a formal language processing technique including scanning said data stream with said hardware packet classifier to classify said received data packets (see col. 36 lines 19-col. 37 lines 22 and col. 103-col. 104).

As to claim 28, Narad teaches the method of claim 27 wherein said regular expressions further include data storage operations (see table16-17)

As to claim 29, Narad teaches the method of claim 23 wherein said DFA is in compressed form (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 30, Narad teaches method of claim 23 comprising:

Receiving a description of grammar rules in the form of a grammar packet classification language;

Compiling said grammar packet classification language to produce a grammar graph;

Configuring a classifier with said grammar graph;

Processing said data stream in accordance with a formal language processing technique using said grammar packet classification language including parsing said data stream with said grammatical packet classifier to identify a protocol structure in a received data packet; and

Processing said received data packet in accordance with said protocol structure (see col. 9 lines 1-35, col. 8 lines 50-65 and col. 36 lines 19-col. 37 lines 22 and col. 103-col. 104).

As to claim 31, Narad teaches a network data packet classifier comprising: an input port for receiving network data packets comprising a stream of data; a memory assemblage configured with data representing a deterministic finite automaton (DFA), said DFA representing. plural regular expressions according to a language definition;

and decompression logic operatively coupled to said memory assemblage and configured to process said stream of data using said language definition in accordance with a formal language processing technique including scanning said stream of data with said DFA to find a matching one of said regular expressions, said regular expressions having corresponding class identifiers, wherein each of said network data packets is associated with the class identifier of said regular expression that matches it (see col. 4 lines 47-67, col. 9 lines 1-35, col. 8 lines 50-65 and col. 36 lines 19-col. 37 lines 22).

As to claim 32, Narad teaches the classifier of claim 31 wherein some of said regular expressions include arithmetic instructions and logic instructions, said memory assemblage further configured to contain said instructions, the classifier further including an arithmetic logic unit operatively coupled to said decompression logic and configured to execute said instructions (see col. 4 lines 47-67, col. 9 lines 1-35, col. 8 lines 50-65 and col. 36 lines 19-col. 37 lines 22).

As to claim 33, Narad teaches the classifier of claim 32 further including at least one register operatively coupled to said arithmetic logic unit, said arithmetic logic unit further configured to store data into said register in response to a save instruction (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 34, Narad teaches the classifier of claim 32 further including skip logic operatively coupled to said logic component and configured to skip over an amount of data in response a skip instruction (see table16-17).

As to claim 35, Narad teaches the classifier of claim 31 wherein said network data packets can vary from one packet to another (see col. 36-col. 37).

As to claim 36, Narad teaches the classifier of claim 31 wherein said DFA is in compressed form (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 37, Narad teaches the classifier of claim 36 wherein said DFA comprises plural non-default states and plural default states, and said memory assemblage comprises a base memory, a next-state memory, and a default-state memory; said base memory configured to contain address locations of said next-state memory, said next-state memory representing all of said non-default states, said default-state memory representing all of said default states (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 38, Narad teaches the classifier of claim 37 wherein said memories are random access memories (see col. 42 lines 35-67).

As to claim 39, Narad teaches the classifier of claim 37 wherein said memories are read only memories (see col. 42 lines 35-67).

As to claim 40, Narad teaches a network data packet classifier comprising:

an input configured to provide a data packet comprising a stream of data; a first system of memory configured with data representing a deterministic finite automaton (DFA), said DFA defined in accordance with a language definition and comprising plural states including an initial state and plural terminating states; a system of logic circuits operatively coupled to said first system of memory and to said input, and configured to

process said data stream using said language definition in accordance with a formal language processing technique including a step to lexically scan said data stream with said DFA to produce a reached terminating state; and a second system of memory configured with data representing a class index corresponding to each of said terminating states and configured to output a class index in response to the production of said reached terminating state (see col. 4 lines 47-67, col. 9 lines 1-35, col. 8 lines 50-65 and col. 36 lines 19-col. 37 lines 22).

As to claim 41, Narad teaches the classifier of claim 40 further including a third system of memory configured to contain current state information for plural input channels, said system of logic circuits operatively coupled to said third system of memory to initialize said DFA in accordance with current state information corresponding to the input channel associated with said data packet.

As to claim 42, Narad teaches the classifier of claim 40 wherein some of said states have one or more associated instructions, the classifier further including an arithmetic logic unit operatively coupled to said system of logic circuits and configured to execute said instructions (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 43, Narad teaches the classifier of claim 42 further including at least one register operatively coupled to said arithmetic logic unit, said arithmetic logic unit further configured to store data into said register in response to a save instruction (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 44, Narad teaches the classifier of claim 42 further including skip logic operatively coupled to said logic component and configured to skip over an amount of data in response a skip instruction (see table16-17).

As to claim 45, Narad teaches the classifier of claim 40 wherein said stream of data is a stream of bytes (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 46, Narad teaches the classifier of claim 40 wherein said network data packets can vary from one packet to another (see col. 36-col. 37).

As to claim 47, Narad teaches a network packet classifier comprising: means for receiving an incoming network packet; means for processing said network packet in accordance using a language definition in accordance with a formal language ,processing technique including classifying said network packet by matching the pattern of its constituent data against plural regular expressions, each regular expression having a corresponding class identifier; and means for outputting a class identifier of the regular expression which matches said network packet (see col. 4 lines 47-67, col. 9 lines 1-35, col. 8 lines 50-65 and col. 36 lines 19-col. 37 lines 22).

As to claim 48, Narad teaches the classifier of claim 47 wherein said means for scanning includes a memory component configured with data to represent a deterministic finite automaton (DFA) (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 49, Narad teaches the classifier of claim 48 wherein said means for outputting includes a second memory component configured with said class identifiers (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22)

As to claim 50, Narad teaches the classifier of claim 47 wherein some of said states have one or more associated instructions, the classifier further including an arithmetic logic unit operatively coupled to said system of logic circuits and configured to execute said instructions (see col. 8 lines 65-col. 9 lines 30 and col. 36 lines 19-col. 37 lines 22).

As to claim 51, Narad teaches a network packet classifier comprising:
a dual-ported memory component; first classification logic operatively coupled to a first port of said dual-porte memory component and having a first input for receiving a data stream; and second classification logic operatively coupled to a second port of said dual ported memory component and having a second input for receiving a data stream, said memory component configured to contain a deterministic finite automaton (DFA) representative of a language a definition and comprising plural states, said DFA representing plural regular expressions for matching data packets, said first and second classification logic each configured to process its associated

data stream using said language definition according to a formal language processing technique including a step to scan its associated data stream using said DFA to identify data packets contained therein and to classify identified data packets (see col. 4 lines 47-67, col. 9 lines 1-35, col. 8 lines 50-65 and col. 36 lines 19-col. 37 lines 22).

As to claim 52, Narad teaches the classifier of claim 51 wherein said network data packets can vary from one packet to another (see col. 36-col. 37).

As to claim 53, Narad teaches the classifier of claim 51 wherein said regular expressions include arithmetic and logic operations (see col. 36 lines 45-60).

As to claim 54, Narad teaches the classifier of claim 51 wherein said regular expressions further include skip operations (see table16-17).

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Packet classification state machine having reduced memory storage requirements by Welfeld, U.S. Patent No. 6,424,934.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hussein A El-chanti whose telephone number is (571)272-3999. The examiner can normally be reached on Mon-Fri 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ario Etienne can be reached on (571)272-4001. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hussein El-chanti

Nov. 11, 2004

SALEH NAJJAR
PRIMARY EXAMINER